Breeding, Evaluation and Culture of Buffalograss for Golf Course Turf

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Goals:

- *Develop vegetative and seeded turf-type buffalograsses which conserve energy and water.*
- *Develop buffalograss establishment protocols and management systems to provide acceptable golf course rough and fairway turf which significantly reduced cultural inputs.*
- *Determine the range of adaptation of turf-type buffalograss.*
- *Evaluate potential insect and disease pests of buffalograss.*
- *Evaluate physiological and biochemical principles of environmental stress and nutrient utilization in buffalograss.*

Cooperators:

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Through September 1995, sales of '609' were approximately $1,125,000. This is slightly better than in 1994. Total production is now 440 acres at four locations in Texas. In September, a royalty check for $48,642.86 was received from Crenshaw & Doguet for '609' sales during the first half of 1995. Sales of '378' have been fairly good ($53,424), although the weather in Nebraska this spring and summer was poor, having a significant effect on sales. Figures for '315' have not been released.

Three new vegetative buffalograsses are targeted for release in 1996. Those are NE 86-61, NE 86-120 and NE 91-118. Crenshaw & Doguet continue to expand production through sub-licensees. So far this has been a small part of their business, but there is potential for growth in Arizona, Missouri, and Colorado.

Native Turf Group and the University of Nebraska cooperatively released CODY and TATANKA seeded buffalograsses in 1995. There was only a limited amount of CODY available this year, and it was sold in small (2 lb.) lots. However, interest was very strong, and fair supplies of seed will be available in 1996. Only research supplies of TATANKA were available this year, but it should be commercially available in 1996. Sharp Brothers Seed has planted production fields of their UNL derived synthetics, but these seeded buffalograsses will not be commercially available until 1997.

The hot and dry summer experienced in Nebraska this year was ideal for evaluating buffalograss selections for tolerance to heat and drought. However, the best performing

genotypes in previous years have been very consistent. This is evident in the National Turfgrass Evaluation Program's buffalograss trial where '378' , '609' , and '315' were the top vegetative materials in the test. Top experimentals and cultivars in a low cutting height evaluation were put into a crossing block for the development of a buffalograss variety appropriate for fairway use. In other evaluation trials, several entries repeatedly show up at the top of the rankings, even ahead of currently released '315' and '378'. These include the potential new releases 86-61 and 86-120, but also the experimentals: 91-181, 92-116, 92-135, and 93-181.

Real improvement in the seeded varieties also is evident. The experimental synthetics 90-504-JK and 90-503-JK show very good quality and color ratings, better than the standard seeded varieties. Four synthetic populations are undergoing the third cycle of recurrent selection to improve each population further for turfgrass quality and disease resistance characteristics. After further testing, one of these populations may be released from the University of Nebraska breeding program.

Divergent selection for caryopsis size on two synthetic populations has shown inheritance and potential breeding progress. Realized heritabilities for caryopsis size in both populations are low (0.08 to 0.26) indicating that multiple cycles of selection will be necessary to improve this trait. In separate work, we are selecting for increased germination percentage to improve establishment.

We also are using laboratory techniques for buffalograss improvement through tissue culture and transformation procedures. Thus far, plants of two female clones and a male clone were regenerated through immature inflorescence culture. Callus induction was promoted in the male by an ethylene antagonist ($AgNO_3$), but not in the female. Efforts will continue in refining the cell-culture techniques.

Initial establishment research at two locations indicates significant differences for percent cover of buffalograss and percent weed cover. These preliminary results indicate the best planting date is between May 15 and July 15 for the Nebraska location, and August 15 for Logan, Utah. Final recommendations for planting dates will be made after determining winter survival and the effectiveness of the fall planting dates. Mowing and fertilization studies will be initiated in 1996.

Scanning electron microscope observations of mealybugs on buffalograss leaves suggest that pubescence may facilitate oviposition by providing a framework for the waxy filamentous ovisac, and/or provide a foothold for mealybugs. Evidence suggests that mealybug resistance mechanisms may operate primarily on a whole plant basis or may involve interactions with parasitoid wasps. Heritability estimates for mealybug resistance using maternal half-sib analysis (h^2_m) and offspring-parent regression (h^2_{OP}) were 0.87 and 0.56, respectively. These relatively high heritabilities suggest that improvements in resistance should be possible.

Mean Turfgrass Quality Ratings of Buffalograss Cultivars for Each Month Grown at Nineteen Locations in the United States. 1994 Data.[2]

	Turfgrass Quality Ratings 1 - 9; 9 = Ideal Turf: Months[1]												
NAME	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**MEAN**
NE 85-378	5.2	4.5	4.3	5.9	5.8	6.6	6.2	5.8	5.7	4.8	4.3	4.3	5.8
609 (NE 84-609)	5.0	4.7	4.6	4.6	4.9	6.0	6.1	5.6	6.1	5.4	5.8	5.1	5.6
NTG-4	4.8	4.5	4.7	6.1	5.2	6.1	5.9	5.7	5.6	4.9	4.8	4.1	5.6
NTG-5	5.3	5.0	4.2	6.3	5.2	6.1	5.9	5.6	5.3	4.9	4.9	3.6	5.5
315 (NE 84-315)	5.2	4.7	4.7	4.8	5.9	6.4	5.7	5.5	5.5	4.7	4.2	3.4	5.5
NTG-2	5.5	4.2	4.6	6.0	5.1	5.9	5.7	5.6	5.5	4.9	4.8	3.6	5.5
NE 84-436	5.0	5.2	4.7	4.8	4.8	6.1	5.8	5.7	5.6	4.7	5.1	3.4	5.4
NTG-3	5.0	5.0	4.2	4.3	5.1	6.0	5.9	5.6	5.5	4.9	5.2	3.6	5.4
AZ 143	5.5	4.7	4.4	4.9	4.9	6.1	5.6	5.6	5.4	4.7	4.4	3.9	5.4
TATANKA (NTG-1)	4.8	4.8	4.2	4.8	4.9	6.0	5.8	5.1	5.3	4.7	4.9	3.9	5.3
TEXOKA	5.2	4.3	4.3	4.8	4.6	5.7	5.6	5.2	5.2	4.8	4.8	3.8	5.2
BISON	5.2	4.3	4.8	5.4	4.8	5.1	5.4	5.0	5.5	4.8	5.3	3.6	5.1
SHARPS IMPROVED	4.8	4.7	4.8	4.2	4.6	5.7	5.4	5.0	5.3	4.8	5.0	3.7	5.1
TOP GUN (BAM 101)	5.0	4.7	4.3	5.4	4.6	5.6	5.5	5.0	5.1	4.6	4.9	3.3	5.0
PLAINS (BAM 202)	4.8	4.3	4.7	4.8	4.4	5.5	5.4	4.8	5.1	4.8	5.2	3.8	5.0
PRAIRIE	5.2	5.0	4.3	4.3	4.1	5.6	5.3	4.9	5.5	5.1	5.2	4.4	5.0
BUFFALAWN	5.0	5.0	4.1	4.1	3.7	5.5	5.4	5.4	5.7	5.0	5.3	4.2	4.9
NE 84-45-3	5.0	4.2	4.1	4.1	4.3	5.3	5.2	4.6	4.4	4.0	4.2	3.1	4.6
HIGHLIGHT 25	5.2	4.8	3.9	3.9	3.6	5.3	4.7	4.9	5.1	5.7	5.2	4.1	4.5
HIGHLIGHT 4	5.2	4.7	3.8	4.0	3.5	5.0	4.9	4.8	5.1	5.0	5.4	4.1	4.5
HIGHLIGHT 15	5.0	4.2	4.0	4.1	3.4	4.8	4.6	4.4	4.9	5.1	5.3	4.3	4.4
RUTGERS	5.3	4.2	3.4	3.8	3.3	4.8	4.7	4.5	5.0	5.1	5.0	4.0	4.3
LSD VALUE	1.6	1.1	1.9	1.7	0.9	0.8	0.7	0.8	0.7	0.9	1.3	1.9	0.6

[1] To determine statistical differences among entries, subtract one entry's mean from another entry's mean. Statistical differences occur when this value is larger than the corresponding LSD Value (LSD 0.05).

[2] Source: National Turfgrass Evaluation Program. National Buffalograss Test - 1993